

WHAT IS CLAIMED:

1. A method for improving the selectivity of a supported highly selective epoxidation catalyst comprising silver in a quantity of at most 0.17 g per m² surface area of the support, which method comprises

- contacting the catalyst, or a precursor of the catalyst comprising the silver in cationic form, with a feed comprising oxygen at a catalyst temperature above 250 °C for a duration of up to 150 hours, and
- subsequently decreasing the catalyst temperature to a value of at most 250 °C.

2. A method as claimed in claim 1, wherein the catalyst, or the precursor of the catalyst, comprises an α -alumina support having a surface area of at least 1 m²/g, and a pore size distribution such that pores with diameters in the range of from 0.2 to 10 μ m represent at least 70 % of the total pore volume and such pores together provide a pore volume of at least 0.25 ml/g, relative to the weight of the support.

3. A method as claimed in claim 1, wherein the catalyst, or the precursor of the catalyst, comprises, in addition to silver, a Group IA metal, and one or more selectivity enhancing dopants selected from rhenium, molybdenum, and tungsten.

4. A method as claimed in claim 3, wherein the catalyst, or the precursor of the catalyst, comprises, in addition to silver, rhenium or compound thereof, a further metal or compound thereof selected from the group of Group IA metals, Group IIA metals, molybdenum, tungsten, chromium, titanium, hafnium, zirconium, vanadium, thallium, thorium, tantalum, niobium, gallium and germanium and mixtures thereof, and optionally a rhenium co-promoter which may be selected from one or more of sulfur,

phosphorus, boron, and compounds thereof, on the support material.

5. A method as claimed in claim 1, wherein the catalyst, or the precursor of the catalyst, comprises silver in a quantity of from 50 to 250 g/kg, on the total catalyst, and the support has a surface area of from 1 to 5 m²/g.

6. A method as claimed in claim 1, wherein the feed comprises oxygen in a quantity of from 1 to 30 %v, relative to the total feed.

7. A method as claimed in claim 6, wherein the feed comprises oxygen in a quantity of from 2 to 25 %v, relative to the total feed.

8. A method as claimed in claim 1, wherein the catalyst, or the precursor of the catalyst, is contacted with a feed comprising oxygen at a temperature in the range of from 250 to 320 °C.

9. A method as claimed in claim 8, wherein the temperature in the range of from 255 to 300 °C.

10. A method as claimed in claim 1, wherein the duration is at least 0.5 hours.

11. A method as claimed in claim 10, wherein the duration is in the range of from 1 to 50 hours.

12. A method as claimed in claim 11, wherein the duration is in the range of from 2 to 40 hours.

13. A method as claimed in claim 1, wherein the feed comprises an olefin, in addition to oxygen.

14. A method as claimed in claim 13, wherein the feed comprises the olefin in a concentration of from 0.5 to 70 mole-%; oxygen in a concentration of from 1 to 15 mole-%; and, in addition, a saturated hydrocarbon, if

any, in a concentration of from 0 to 80 mole-%, relative to the total feed.

15. A method as claimed in claim 14, wherein the feed comprises the olefin in a concentration of from 1 to 60 mole-%; oxygen in a concentration of from 2 to 10 mole-%; and a saturated hydrocarbon in a concentration of from 30 to 75 mole-%, relative to the total feed.

16. A method as claimed in claim 1, wherein the quantity of silver relative to the surface area of the support is in the range of from 0.01 to 0.15 g/m².

17. A method as claimed in claim 16, wherein the quantity of silver relative to the surface area of the support is in the range of from 0.02 to 0.12 g/m².

18. A method as claimed in claim 16, wherein the catalyst, or the precursor of the catalyst, comprises silver in a quantity of from 50 to 250 g/kg, on the total catalyst, and the catalyst comprises an α -alumina support having a surface area of from 1 to 5 m²/g, and a pore size distribution such that pores with diameters in the range of from 0.2 to 10 μ m represent at least 70 % of the total pore volume and such pores together provide a pore volume of at least 0.25 ml/g, relative to the weight of the support.

19. A method as claimed in claim 16, wherein the catalyst, or the precursor of the catalyst, comprises, in addition to silver, a Group IA metal, and one or more selectivity enhancing dopants selected from rhenium, molybdenum, and tungsten.

20. A method as claimed in claim 19, wherein the catalyst, or the precursor of the catalyst, comprises, in addition to silver, rhenium or compound thereof, a further metal or compound thereof selected from the group

of Group IA metals, Group IIA metals, molybdenum, tungsten, chromium, titanium, hafnium, zirconium, vanadium, thallium, thorium, tantalum, niobium, gallium and germanium and mixtures thereof, and optionally a rhenium co-promoter which may be selected from one or more of sulfur, phosphorus, boron, and compounds thereof, on the support material.

21. A method as claimed in claim 16, wherein the catalyst, or the precursor of the catalyst, is contacted with a feed comprising oxygen at a temperature in the range of from 250 to 320 °C.

22. A method as claimed in claim 21, wherein the catalyst, or the precursor of the catalyst, is contacted with a feed comprising oxygen at a temperature in the range of from 255 to 300 °C.

23. A method as claimed in claim 16, wherein the duration is in the range of from 1 to 50 hours.

24. A method as claimed in claim 23, wherein the duration is in the range of from 2 to 40 hours.

25. A method as claimed in claim 24, wherein the feed comprises the olefin in a concentration of from 0.5 to 70 mole-%; oxygen in a concentration of from 1 to 15 mole-%; and, in addition, a saturated hydrocarbon, if any, in a concentration of from 0 to 80 mole-%, relative to the total feed.

26. A process for the epoxidation of an olefin, which process comprises the steps of

- contacting a supported highly selective epoxidation catalyst comprising silver in a quantity of at most 0.17 g per m² surface area of the support, or a precursor of the catalyst comprising the silver in cationic form, with a feed comprising oxygen at a catalyst temperature

above 250 °C for a duration of up to 150 hours, and
- subsequently decreasing the catalyst temperature to a value of at most 250 °C and contacting the catalyst with the feed comprising the olefin and oxygen.

27. A method as claimed in claim 26, wherein the quantity of silver relative to the surface area of the support is in the range of from 0.01 to 0.15 g/m².

28. A method as claimed in claim 27, wherein the quantity of silver relative to the surface area of the support is in the range of from 0.02 to 0.12 g/m².

29. A method as claimed in claim 27, wherein the catalyst, or the precursor of the catalyst, comprises silver in a quantity of from 50 to 250 g/kg, on the total catalyst, and the catalyst, or the precursor of the catalyst, comprises an α -alumina support having a surface area of from 1 to 5 m²/g, and a pore size distribution such that pores with diameters in the range of from 0.2 to 10 μ m represent at least 70 % of the total pore volume and such pores together provide a pore volume of at least 0.25 ml/g, relative to the weight of the support.

30. A method as claimed in claim 29, wherein the catalyst, or the precursor of the catalyst, comprises, in addition to silver, rhenium or compound thereof, a further metal or compound thereof selected from the group of Group IA metals, Group IIA metals, molybdenum, tungsten, chromium, titanium, hafnium, zirconium, vanadium, thallium, thorium, tantalum, niobium, gallium and germanium and mixtures thereof, and optionally a rhenium co-promoter which may be selected from one or more of sulfur, phosphorus, boron, and compounds thereof, on the support material.

31. A method as claimed in claim 26, wherein in the step in which the catalyst, or the precursor of the catalyst,

is contacted at a temperature above 250 °C with a feed comprising oxygen, the temperature is selected in the range of from 255 to 320 °C.

32. A method as claimed in claim 26, wherein the duration is in the range of from 1 to 50 hours.

33. A method as claimed in claim 26, wherein in the step in which the catalyst, or the precursor of the catalyst, is contacted at a temperature above 250 °C with a feed comprising oxygen, the feed comprises the olefin in a concentration of from 0.5 to 70 mole-%; oxygen in a concentration of from 1 to 15 mole-%; and a saturated hydrocarbon, if any, in a concentration of from 0 to 80 mole-%, relative to the total feed.

34. A process as claimed in claim 26, wherein the olefin is ethylene.

35. A process as claimed in claim 26, wherein the feed comprising the olefin and oxygen comprises in addition, as a reaction modifier, an organic chloride and optionally a nitrate- or nitrite-forming compound.

36. A process as claimed in claim 26, wherein the catalyst temperature is decreased to a value in the range of from 180 to 250 °C.

37. A process as claimed in claim 36, wherein the catalyst temperature is decreased to a value in the range of from 200 to 245 °C.

38. A process for producing a 1,2-diol, 1,2-diol ether, or an alkanolamine, comprising converting an olefin oxide into the 1,2-diol, the 1,2-diol ether, or the alkanolamine, wherein the olefin oxide has been obtained by a process for the epoxidation of an olefin according to claim 26.